# UNITED STATES PATENT AND TRADEMARK OFFICE

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| 10/537,618 | 06/03/2005 | Christopher Thorne | GB020248 | 5448 |

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| EXAMINER |
|---|
| MILLIKIN, ANDREW R |

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on _12 February 2007_.

2a)☒ This action is **FINAL**.        2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) _1-25_ is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) _1-25_ is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All  b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1)☐ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4)☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5)☐ Notice of Informal Patent Application

6)☐ Other: _____.

# DETAILED ACTION

## *Claim Rejections - 35 USC § 101*

1.      35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

2.      Claims 1-25 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. Claims are directed to a method and apparatus that fail to produce a tangible result. A musical key is determined, notes are identified, etc., but no tangible result is produced.

## *Claim Rejections - 35 USC § 103*

3.      The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4.      Claims 1-14 & 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aoki (U.S. Patent No. 5,424,486, hereafter '486) in view of Fujishima (U.S. Patent No. 6,057,502, hereafter '502).

5.      Claim 1:      '486 teaches a method for determining the key of an audio signal on the basis of chord information (see: abstract), but does not explicitly teach that the method includes the steps of:

for each of a plurality of signal portions of the audio signal, analyzing the signal portion to identify a musical note, and where at least one musical note is identified: determining a strength associated with the or each musical note; and generating a data record containing the identity of the or each musical note, the strength associated with the or each musical note and the identity of the portion;

for each of the data records, ignoring the strength associated with an identified musical note where said strength is less than a predetermined fraction of the maximum strength associated with any identified musical note contained within the data records;

determining a first note from the identified musical notes as a function of their respective strengths;

selecting at least a second and a third note from the identified musical notes as a function of the first note; or

determining the key based on a comparison of the respective strengths of the at least second and third notes.

'502 teaches a method for recognizing chords, including the steps of:

for each of a plurality of signal portions (column 6, lines 60-67; column 7, lines 61-63), analyzing the portion to identify a musical note ("frequency components"), and where at least one musical note is identified: determining a strength associated with the or each musical note ("a frequency spectrum having a number of peak energy levels"); and generating a data record containing the identity of the or each musical note, the strength associated with the or each musical note and the identity of the portion (column 2, lines 42-56);

for each of the data records, ignoring the strength associated with an identified musical note where said strength is less than a predetermined fraction

of the maximum strength associated with any identified musical note contained

within the data records (column 10, lines 38-52; see Fig. 11);

determining a first note from the identified musical notes as a function of

their respective strengths (column 10, lines 38-41);

selecting at least a second and a third note from the identified musical

notes as a function of the first note (column 10, lines 62-66); and

determining the key based on a comparison of the respective strengths of

the at least second and third notes ('502 determines the chord based on a

comparison of the respective strengths of the notes (column 7, lines 27-53), and

'486 determines the key on the basis of chord information (see: abstract)).

Using the chord-determining method of '502 in order to determine the chords '486 uses

to determine the key in order to increase the accuracy of detecting chords, decrease the

possibility of noise frequency components affecting the detection of the chords, and to

account for the case where the pitches of all the tones in the musical tune to be

analyzed are deviated as a whole (see background of '502). Therefore, it would have

been obvious to one of ordinary skill in the art at the time the invention was made to

have used the chord-determining method of '502 in order to determine the chords '486

uses to determine the key in order to have increased the accuracy of detecting chords,

decreased the possibility of noise frequency components affecting the detection of the

chords, and to have accounted for the case where the pitches of all the tones in the

musical tune to be analyzed were deviated as a whole.

Claims 2, 3, 4, 5:    '502 teaches the method as claimed in claim 1, wherein:

each signal portion is the same size (column 8, lines 2-8); each signal portion

encompasses the same length of time (ibid); the size of the signal portion is a function

of the tempo of the audio signal (ibid); the signal portions are contiguous (column 6,

lines 60-64; see also Fig. 2).

Claims 6-8:   '502 teaches the method as claimed in claim 1, wherein: the

predetermined fraction is determined in dependence on the content of the audio signal

(column 10, lines 38-41; see Figs. 7, 11, 15a, 15c)). '502 also teaches the method as

claimed in claim 1, wherein the predetermined fraction lies in the range of one tenth to

one half and wherein the predetermined fraction is one seventh, because any note that

doesn't have a high enough amplitude will get attenuated further by the peak

enhancement and autocorrelation steps (columns 8-10) and then cut out completely in

order for the chord to be determined (columns 12-14; Figs. 15a, 15b, 15c). As a result, a

quiet note (such as one of the smaller peaks in Fig 15a) will be ignored (see Fig 15c),

especially if it has extremely low amplitude. Since a note of the smallest amplitude

imaginable would be ignored in '502, musical notes which have a strength less than one

seventh (or one tenth) of the maximum strength associated with any identified musical

note contained within the data records would be ignored.

Claim 9:    '502 teaches the method as claimed in claim 1, wherein the step of

analyzing the signal portion to identify a musical note comprises the steps of:

converting the signal portion to a frequency domain representation

(column 7, lines 10-11);

subdividing the frequency domain representation into a plurality of octaves

(column 7, lines 19-20);

for each octave containing a maximum amplitude:

determining a frequency value at the maximum amplitude (this is

necessarily accomplished by performing the FFT); and

selecting a note name of a musical scale in dependence on the frequency

value (column 10, lines 62-67); and

identifying a musical note in dependence on the same note name being

selected in more than one octave (column 8, lines 20-61).

Claim 10:     '502 teaches the method as claimed in claim 9, wherein the

conversion of the signal portion to a frequency domain representation is performed by

means of a Fourier Transform (column 7, lines 10-11).

Claim 11:     '502 teaches the method as claimed in claim 9, wherein the musical

scale is the Equal Tempered Scale (column 10, line 64).

Claims 12:     '502 teaches the method as claimed in claim 1, wherein the step of

determining a strength associated with the or each musical note comprises the steps of:

determining the amplitude of each frequency component of the musical note; and

summing the amplitudes (column 8, lines 51-54).

Claim 13:      '502 teaches the method as claimed in claim 1, wherein the step of

determining the first note comprises the steps of: for each identified musical note,

summing the strengths associated with the musical note in the data records (see claim

12 above); and determining the first note to be the identified musical note with the

maximum summed strength (all notes will be identified in the process of carrying out the

FFT, including the note with the maximum summed strength; since all of the notes are

compared to all of the other notes (see columns 12-14), any one note can be referred to

as "a first note").

Claim 14:      '502 teaches the method as claimed in claim 1, wherein the first

note is the tonic of the key (see Fig. 15a, 15b (C Major); the first note (C; on the right

side of Fig. 15a) is the tonic of the key (C Major)).

Claims 15-23 are rejected for substantially the same reasons as claims 1-14.

Claim 24:      '486 teaches the apparatus as claimed in claim 15, wherein said

apparatus further comprises an output device for sending data corresponding to the key

of the audio signal (the bus, part 11).

Claim 25:      '502 teaches a record carrier comprising software for causing a

processor to carry out the method as claimed in claim 1 (column 15, lines 10-15).


### Response to Arguments

6.      Applicant's arguments filed 12 February 2007 have been fully considered, but

they are not persuasive.

7.      Applicant argues that determining a key produces a tangible result. Examiner

disagrees. A real world result must be produced in order for there to be a tangible result:

the key must be displayed, used to modify a pitch, etc. Claims are nonstatutory if they

simply manipulate abstract ideas, e.g., a bid or a bubble hierarchy, without some

claimed application.

8.      Applicant argues that the combination of Aoki and Fujishima does not lead to the

claim 1 limitation "determining the key based on a comparison of the respective

strengths of the at least second and third notes." Examiner disagrees. In '502, column 7,

lines 27-53, the frequency spectrum of a music signal is analyzed in order to find peaks,

which correspond to notes, in order to identify chords, which are combinations of 3 or

more notes. First, the notes are compared in strength to find a peak (column 7, lines 27-

42), and then enhanced octave profiles are compared in order to identify chords, thus

again comparing strengths of multiple notes to one another. '486 uses a chord to

identify the key.

### *Conclusion*

9.      **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time

policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE

MONTHS from the mailing date of this action.  In the event a first reply is filed within

TWO MONTHS of the mailing date of this final action and the advisory action is not

mailed until after the end of the THREE-MONTH shortened statutory period, then the

shortened statutory period will expire on the date the advisory action is mailed, and any

extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action.  In no event, however, will the statutory period for reply expire later

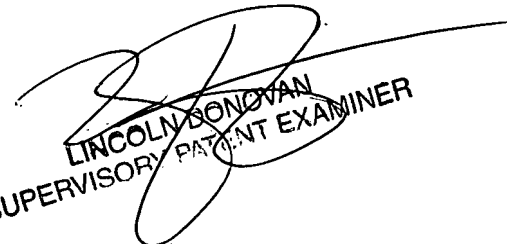than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Andrew Millikin whose telephone number is 571-270-

1265.  The examiner can normally be reached on M-R 7:30-5 and 7:30-4 Alternating

Fridays (EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Lincoln Donovan can be reached on 571-272-1988.  The fax phone number

for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the

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published applications may be obtained from either Private PAIR or Public PAIR.

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